Timothy D. Baldwin. Communicating with university students in an emergency: A survey of what they know and how to reach them. A Master's Paper for the M.S. in I.S degree. April, 2008. 67 pages. Advisor: Stephanie Haas

The recent emergencies on college campuses including the Virginia Tech massacre of April, 2007, the Northern Illinois University shootings and the Union University tornado highlight the importance of disaster preparedness within the university community. This study is a survey exploring the daily rhythms of student life, the communication channels open to students and students composition and characteristics.

This survey finds that students have frequent access to communication technologies which can be utilized as warning channels. The study also concludes that many students do not actively seek out information relative to emergency preparedness and the gaps in the populations knowledge require increased disaster education by the university.

Headings:

Natural disaster warning systems -- Research.

Emergency management -- United States.

Natural disasters -- United States.

Universities and colleges -- United States -- Safety measures

COMMUNICATING WITH UNIVERSITY STUDENTS IN AN EMERGENCY: A SURVEY OF WHAT THEY KNOW AND HOW TO REACH THEM

by
Timothy D. Baldwin

A Master's paper submitted to the faculty
of the School of Information and Library Science
of the University of North Carolina at Chapel Hill
in partial fulfillment of the requirements
for the degree of Master of Science in
Information Science.

Chapel Hill, North Carolina

April 2008

Approved by

_____

Stephanie Haas

Table of Contents

1.0 Introduction

Disasters can happen anytime and anywhere. The risk they present can be well known or a relative mystery; they can be products of our environment, a result of our technologies or engendered by us. Conceptually, the idea of disasters can be stretched beyond the natural hazards and industrial accidents traditionally associated with the term to include acts of terrorism and violence that generate the same severe danger and societal disruption.

Disasters can be then defined as:

> an event concentrated in time and space, in which a society or a relatively self-sufficient subdivision of society undergoes severe danger and incurs such losses to its members that the social structure is disrupted and the fulfillment of some or all of the essential functions of the society are prevented. (Fritz, 1961)

The activities undertaken by society as a whole in relation to disasters can be broadly broken out into four categories based on time and purpose: mitigation, preparation, response and recovery. (Mileti, 1999)

Mitigation activities are generally concerned with reducing the chance of a disaster occurring or reducing the severity of a disaster once it happens. Examples are the building of levees to prevent flooding or the creation of building codes to reduce damage from earthquakes.

Preparatory activities include training for the inevitable, building systems and organizational structures to handle disasters and running rehearsals of disaster scenarios.

Among the systems developed are warning dissemination systems such as tornado sirens, mass email or text messaging systems and reverse 911.

Response activities are concerned with the immediate before and after of a disaster. Response activities can include evacuation, dispatch of emergency workers and activation of a warning dissemination system.

The recovery phase covers assistance to an area so it can resume normal activities. During this phase damage is assessed, infrastructure is restored, and lessons learned are distilled for planning for the next disaster.

Warnings allow people in harm's way to "take actions that save lives, reduce losses, speed response, and reduce human suffering." (Working Group Report, 2000) Warnings are transmitted during the response phase of a disaster, but the systems over which they are sent should be established during the preparation phase.

This study's focus is on the actual dissemination of warning information to the public, in particular college student populations, and the characteristics of that population that affect the effectiveness of warning messages. This study does not address the transmission of warning information between authoritative bodies or the organizational bodies' decision-making processes involved with the transmission of a warning. Nor does this study compare technological solutions. It is concerned only with factors of warnings messages that are directly tied to characteristics of the student population.

Universities are an interesting microcosm serving an unusual population. Although they co-exist in context with an external community with which they have ties and

coordinate, within their borders they typically possesses the capability to react during emergencies independent of external authorities. They have responsibility during emergencies for the welfare of everyone falling inside this jurisdiction. On any given day a university population is comprised of students, visitors, teaching staff, support employees, and at schools with teaching hospitals, patients.

The student population is well defined by the university in many respects. Enrollment information provides an exact snapshot of age, gender, and race and the numbers of students enrolled and the breakdown of numbers by academic status. Class registries can also give a rough estimate of the location of part of the student body during class hours (day or evening).

The population is neglected in disaster literature despite several recent high-profile incidents including the Virginia Tech massacre (4/16/2007), the Northern Illinois University shootings (2/14/2008), and the Union University tornado (2/5/2008). Although there are good studies on students' broad use of information technologies, little is known about how students interact with those technologies during day-to-day activities. No previous research was found during the course of this research about students' background knowledge of disaster response and personal experiences with emergencies.

The effectiveness of risk communications such as warning messages is dependant both on the understanding of how best to reach an at-risk-population, and once reached, how best to effectively transmit information.

This paper describes a survey conducted of the student population at the University of North Carolina at Chapel Hill. The purpose of the survey was to elicit from students information on their composition, education and preparation for risks, and to better understand the makeup of communication channels that can be used to effectively reach them with an alert during an unpredictable, fast moving event.

2.0 Background

A wealth of research has been done on the societal and physical effects of disasters, as well as on predicting disasters and the technology used for mitigation and response. Tierney, Lindell & Perry (2001) give an excellent review of the focus and theoretical framework of disaster research in the last fifty years. The research done in this study rests on the behavioral and social science perspectives of disaster response covered in the Tierney et al paper.

Disasters can be grouped into categories based on their origins. The prototypical disaster is a natural one, such as a hurricane, earthquake, or tornado. Industrial accidents, transportation accidents, chemical spills and the like can be classified as industrial or technological in nature. Lastly, terrorist and willful acts of violence fall into their own category.

Each specific disaster possesses a set of general characteristics. Although there are many possible ways to define these characteristics a useful set is:

- Speed of onset
- Scope of Impact
- Duration of impact
- Health threat
- Property threats
- Secondary threats
- Predictability

(Lindell & Perry, 1992)

Disasters with a rapid speed of onset and a low predictability are the least covered in the warning literature and present the smallest possible window for authorities to warn at-risk-populations. Disasters such as hurricanes are detected days before putting populations at risk and offer numerous opportunities for authorities to prepare and warn the public. Even so, increased opportunities do not mean a warning message will be received or heeded by the audience as seen in the failure of many citizens to evacuate New Orleans ahead of Hurricane Katrina. (a. Spence, Lachlan, Griffin, & Donyale, 2007)

A widely used model for understanding the processes people undergo when a warning message is transmitted breaks the process into five phases: receiving, understanding, believing, personalizing and deciding on a response. During all the phases, efforts at confirmation of the alert message will be made. The phases are not in absolute order and not all will happen every time. (Mileti, 1995)

To review impacts to this five step process, a division along two central themes can be made. First, is the reception of the warning message: understanding what communication channels are available and how the daily rhythm of recipients brings them in and out of contact. Second is looking at the two sets of factors involved in the understanding, believing, and personalizing the warning message. These two sets of are known as "message factors" and "receiver attributes." The goal of the first four steps is to get the warning out and have the warned population take the correct steps to protect themselves.

2.1 Receiving Messages

The first step of the warning message process is the reception of a warning message; if the message cannot reach the at-risk population nothing else will matter. There are many examples in the literature of warning systems failing to reach part or all of the at-risk-population. (Working Group Report, 2000) (Aguirre, 1991) An infamous recent example is the Christmas Tsunami that struck South East Asia with little to no warning which cost thousands their lives, (although a lack of warning system was not the sole factor). (Bird & Lubkowski, 2005)

Given a long lead-time as with a hurricane it is not critical for a warning message to reach everyone at once or to persuade them to act immediately according to instruction. Multiple opportunities exist not only for them to receive messages from authorities but also to receive notice from others.

In a fast moving event the window of time available for a warning is so short that every possible avenue must be pursued in order to maximize reach and effectiveness. There may be time and opportunity for only a single message to get out. Telephone systems may be damaged or destroyed or just overwhelmed by recipients attempting to confirm or reach friends and family. In recent history, cell networks were overwhelmed during the 9-11 terrorist attacks, the London subway bombings, and the Minneapolis bridge collapse. (Arizona Public Safety Communications Commission, 2007) The Virginia Tech shootings caused not just a localized cellular network breakdown but also overwhelmed the switched network. (Virginia Tech, 2007)

The Internet offers additional channels to reach citizens but isn't guaranteed to work during an emergency. Not only is the infrastructure vulnerable to power outages such as the blackout in the Northeast in 2003, but unprecedented volume of use may render it inoperable. The Virginia Tech website saw a 3000% increase in traffic April 16th, and its gateways to the Internet a 300% spike in usage requiring an immediate response by IT support staff. (Virginia Tech, 2007)

During the Hurricane Katrina disaster the entire communication infrastructure was taken offline in the initial event. This prevented information about the levee collapse and subsequent flooding from being disseminated to the affected areas. (Meeds, 2006)

As previously mentioned two areas of focus in the reception of messages are the selection of communication channels and developing a picture of the daily rhythms of recipients. Effective dissemination of warnings thus requires selecting the best communication channels, which in turn depends on understanding the recipients' rhythms of daily life, including their connection to the candidate channels.

2.1.1 Choosing the right channel.

Given the fragility of the infrastructure during fast moving emergencies, universities must decide how to issue a warning for maximum reach among the at-risk population. At their disposal are a large number of potential channels of communication, although this set of channels will vary somewhat based on the preparation the university in question has undergone.

A sample set of channels could be sirens, email, text messaging, reverse 911 through switched networks, voice mail to cell and landline phones, the web, RSS feeds, network television, cable television, local radio, bullhorns on police vehicles, and door to door warnings from police or other authority figures.

Channels can be thought of in a number of ways, for example push versus pull. Pull channels such as an updated web page rely on people reaching out to find information while push technologies export information directly to the public via channels such as TV, email, or phone calls. (Frédérique & Ad, 2007)

In an immediate crisis it is more likely that push technologies such as text-messaging, sirens, or reverse 911 will reach the at-risk-population in time while pull channels are better for seeking follow up information. In a survey of residents given a tsunami warning, 23% received the warning from TV, 30% from commercial radio, and 23% from word of mouth. Four times as many people sought follow-up information from the web as any other source of information (although 70% sought no follow-up at all). (King, 2008)

Each potential channel has a number of other variables that affect its usefulness and appropriateness during a crisis. A model of these dimensions includes:

- Precision of dissemination
- Penetration of normal activities
- Specificity of message
- Susceptibility of message distortion
- Rate of dissemination over time
- Receiver requirements
- Sender requirements
- Feedback

(Lindell & Perry, 1992)

During a fast moving event the precision, penetration, and receiver requirements are of primary concern. Precision refers to the ability to reach the at-risk-population without falsely alarming unaffected people. Penetration is the capability of the channel to interrupt the normal activities of recipients, for example a cell phone alert may be ignored during sleeping hours or a TV warning missed during transit. Receiver requirements refer to what the recipients need to get the message, e.g., a phone, TV, web browser, etc. The complexity of the event may also require the specificity of the message to be considered. Sirens, for example, are good for letting people know something is going on but not for issuing precise instructions.

For each emergency the best possible set of channels should be selected to reach everyone at risk without overreaching and warning non-at-risk populations. In a fast moving event the possibility of only getting out one message must be addressed, and channels that are most likely to be effective in penetrating must be chosen.

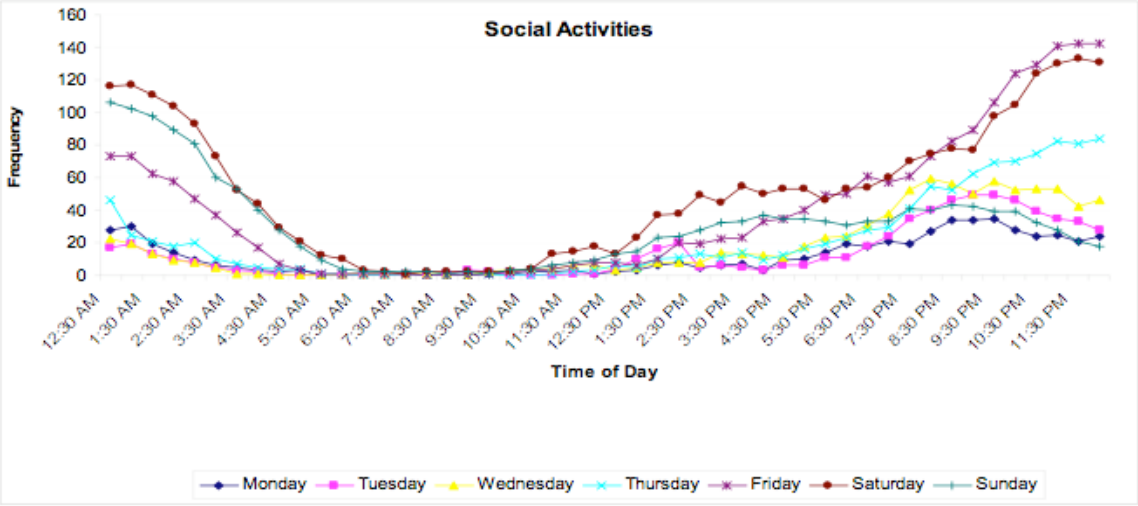
2.1.2 Rhythms of student life.

Influencing the choice of channels are the activities and behaviors of the at-risk population. The student population of any university has its own rhythms and schedule, comprised of waking times, average bedtimes, time spent in class, socializing, studying, exercising, and engaging in a myriad of leisure activities. Students may live on campus and have little to no commute to their classes, or live off campus. Choices are extremely dependant on the school and its location, and the availability of off campus housing. Students may be married or single, part-time or full-time, fresh out of high school or

returning to school after a stint in armed forces. It is very difficult to identify the "average student;" it is, however, possible to draw a picture of the rhythm of the lives they lead.

Student schedules are diverse and very different from those of the working population. For example a small study of NYU undergraduates found an average waking time of 9:18am and a bedtime of 1:42am during the week with even later hours Thursday through Saturday. (Division of Student Affairs, 2007) The NYU study also found that students spend a great deal of time in class and studying, (6.1 hours a day) and socializing, (2.3 hours per day).

Figure 2.1.2.1: NYU Undergraduate Frequency of Social Activities by [Division of Student Affairs, 2007]



Part of that time studying and socializing may be spent online, with undergraduates reporting 14 hours (median) and 18 hours (mean) Internet use per week and an average of 2.35 hours per day. (Caruso & Salaway, 2007) The most popular tools for online socializing are online social networks and instant messaging. Upwards of 90% of undergraduate students use Facebook (Ellison, Steinfeld, & Lampe, 2006) and daily use

of online social networks in the 18-19 age bracket was recently found to be 69.3% and 45.2% among older (ages 20-24) students. (Caruso & Salaway 2007)

Contrast can be shown between the online lives of students with their counterparts in the working world. A recent study (Golder, Wilkinson, & Huberman, 2006) demonstrated the strong contrast of college student use of Facebook during the day (Figure 2.1.2.2), with that of corporate users (Figure 2.1.2.3). Facebook usage can stand as a proxy not only for students' online social network use, but can be extended as a proxy for their presence online in general.

Figure 2.1.2.2: College student messages and pokes per hour (Golder et al., 2006)

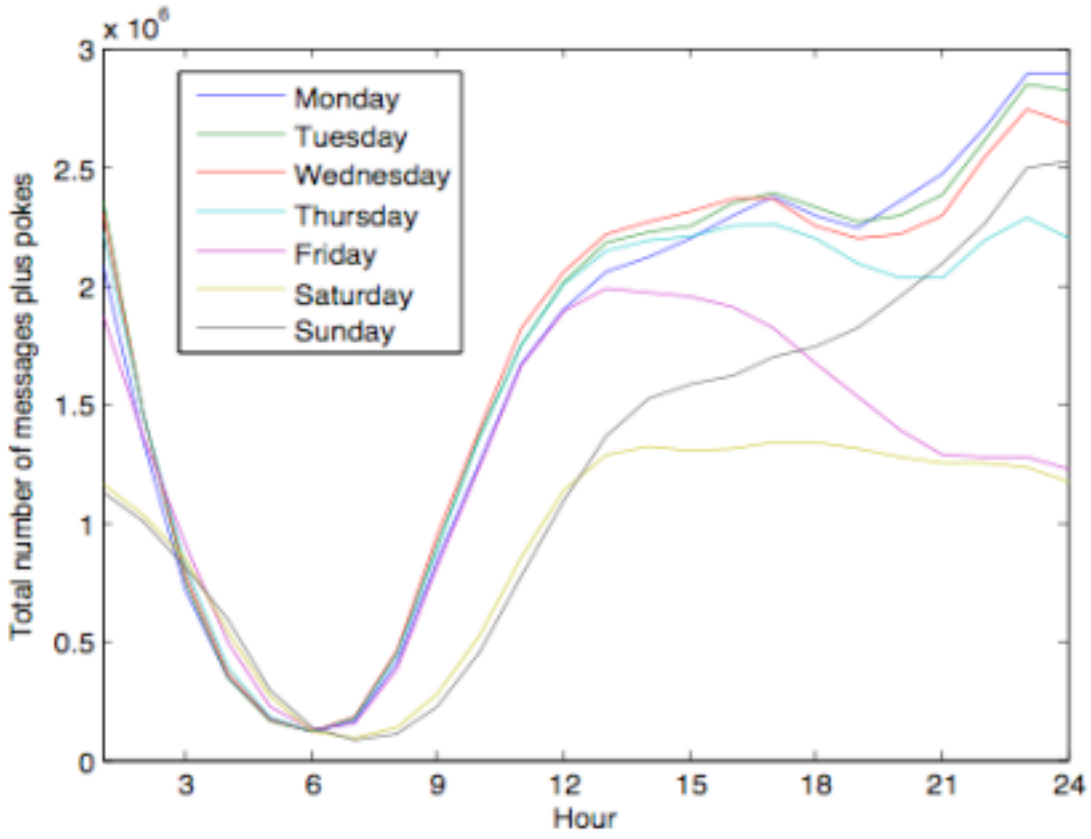
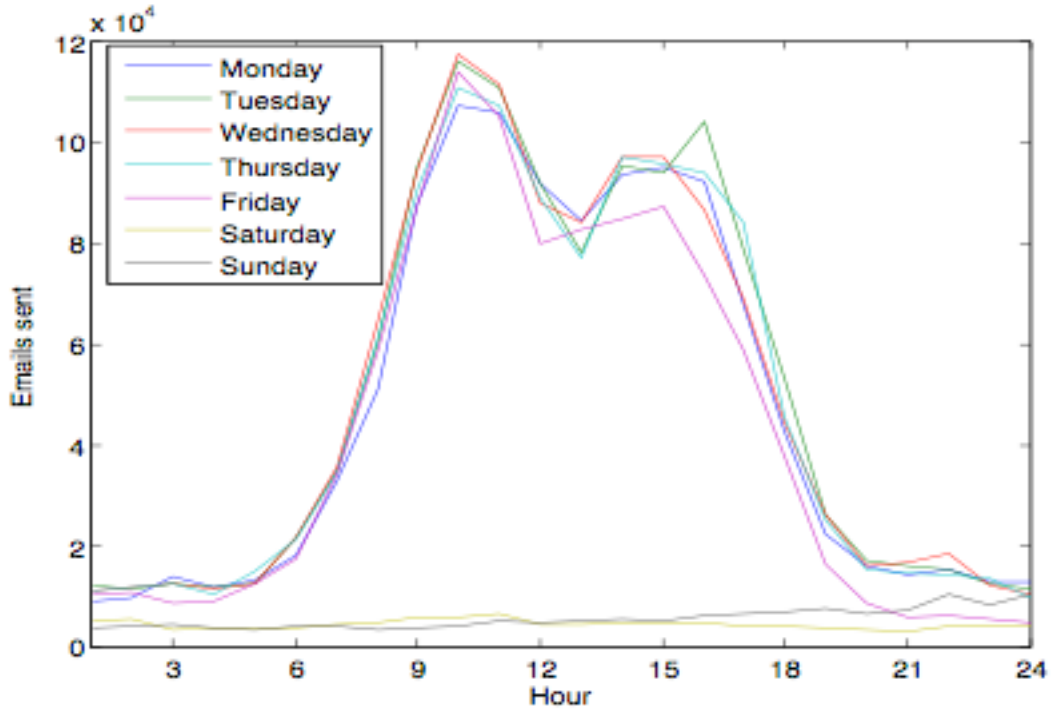


Figure 2.1.2.3: Messages plus pokes sent by hour in a corporate network (Golder et al., 2006)



A picture of students' lives emerges from the research, in particular undergraduate life. Understanding the daily rhythm of students and the communication channels available to them grants an enhanced ability to pinpoint what channels will be effective for issuing a warning during an emergency. It also helps to understand the likelihood of warning messages being transmitted socially from students who are able to receive a message to nearby students who may not be connected.

What is not apparent is how these technologies weave into the daily life of each student. Knowing that college students use the Internet 2.35 hours a day does not show where they are when they are online or how they are connecting. Knowing that they all own a cell phone doesn't show when it is on or when it is sitting in a bag muted. Channels may be available and yet ignored. Students may be socializing without their

phone but never be far from someone connected or may be exercising and completely cut off from all channels.

2.2 Understanding, Believing and Personalizing

Understanding, believing and personalizing the warning message are the next steps in the transition from the reception of a warning message to acting, (or not acting), on it. Understanding means not just comprehending the message but, "personally attaching meaning to it" (Mileti, 1995), that is grasping the nature of the threat. A warning message recipient must believe the contents of the message to be true. The recipient then can personalize the warning, to "consider the implications for themselves and their groups, e.g., their family." (Mileti, 1995)

Impacting the ability of the warned population to understand, believe and personalize the warning are message factors and receiver factors.

2.2.1 Message Factors

Message factors are the attributes of the message itself. A model of these attributes includes:

- Warning Source
- Message consistency
- Accuracy
- Clarity
- Certainty
- Sufficient Information
- Guidance
- Frequency
- Location information
- Channels

(Mileti, 1995)

Although each attribute is important to the total message, only the warning source and channels are involved in a two-sided relationship with the warned population. For example, the clarity of the information in the message is not affected in any way by who

receives the message. Because the success or failures of these factors are independent of the recipients we do not address them here.

The source of the warning is critical for the belief of a warning message, particularly when a message is unexpected or asks for action. The trust or credibility of the warning source will affect the understanding, believing and personalizing of the message.

Trust must be built between the population to be warned and the source of the warning well before an emergency. The trust of an authority can be seen as the result of:

- Perceptions of knowledge and expertise
- Perceptions of openness and honesty
- Perceptions of concern and care

(Peters, Covello, & McCallum, 1997)

The lack of trust or credibility can result in a messages being "seen by readers as lower in quality on various dimensions and the conclusions 'less justified' when the source [is] perceived to have low credibility." (Burkhart, 1991)

Trust is a two way relationship that has to be earned, akin to social capital. Trust can be built through deliberate activities:

- Agency recognition
    - Community awareness of the organization responsible for handling emergency
- Make personnel visible during execution of their jobs during emergencies
- Open channels, one and two way, between the agency responsible for emergency situations and the community

(Perry & Ning, 1985)

Messages received over multiple channels at once such as TV, radio, and email, are perceived as more authoritative. The channel variable in message factors refers only to this multiplicity and is not used in the broader sense. (Mileti, 1995)

2.2.2 Receiver Attributes

Attributes of the at-risk-population affect their ability to be successful at understanding, believing and personalizing a warning message. A model of those attributes includes:

- Environmental clues
- Social factors
- Social ties
- Socio-demographic
- Psychological characteristics
- Pre-warning characteristics

(Mileti, 1995)

Environmental clues consist of the area around the recipient. Is the sky blue making a tornado warning seem wildly inaccurate? Are people strolling by unconcerned while a chemical spill warning has been dispatched? These clues make the message more or less believable, but their impact on any single warning is dependant on the type of event and clues involved. (Mileti, 1995)

Social factors concern the setting in which the warning is received, “whether or not the family is united when the warning is delivered, what activities are being performed at that time, and what others are doing to respond.” (Mileti, 1995) On a college campus the family component is possibly not relevant, but it is unclear if surrogate family units such as fraternities, clubs, and sports teams would play the same role. Activities fall within the previously discussed "rhythms of daily life." The response of nearby people touches on the social nature of a disaster and is complicated by the effectiveness of the message delivery. If no one around you is responding at all to a message, did they not get the message or are they unconcerned?

Social ties are between members of the warned population, and their structures: natural structures such as family units or artificial ones such as a class. Perry (1979) found that cohesion in a family, for example, increased the likelihood of evacuating in one study.

The socio-demographic attributes of the at risk population such as race, age, or income are all factors that influence the response of at-risk-population to warning messages.

Racial and ethnic minorities are in general "less likely to accept a risk or warning message as credible without confirmation of the message from others". (Spence et al., 2007a) For example the Florida Latino population may place more credence on information gathered from friends and community members than from government sources. (Peguero, 2006) But racial and ethnicities are not monolithic in response and the current research is inadequate to fully understand the role race plays. (Philips & Morrow, 2005)

Language can be an important component of the at-risk-population. In multi-language populations warning messages will have to not only be carefully translated but also transmitted through appropriate channels. In the Saragosa tornado of May 22, 1987 a mistranslation of a key word of the Spanish radio warnings broadcasted from an English language station cost Spanish speakers their lives. The Spanish television station did not broadcast a warning, so only the mistranslated radio warning reached that population. (Aguirre, 1991)

Disabilities are also crucial factors in message reception. Although a hearing impaired person may be watching a television broadcast wherein a warning is transmitted via voice, they may not receive the message unless closed captioning is utilized. (Wood, 2003)

Severe disabilities may prevent warning recipients from responding at all. Studies show the disabled are more likely to prepare for a disaster but less likely to be ready to evacuate, possibly due to the lack of a support structure in place or for fear of leaving their current support structure. (Spence, Lachlan, Burke, & Seeger, 2007)

The gender makeup of an at-risk population is also important. A study of evacuation behavior found women twice as likely to evacuate as men. (Riad, Norris, & Ruback, 1999) Women may overall be more risk averse and perceive risks differently than men. (Cutter , Tiefenbacher, & Solecki, 1992) Women are more likely to heed warnings and to urge others to do so. (Phillips & Morrow, 2005)

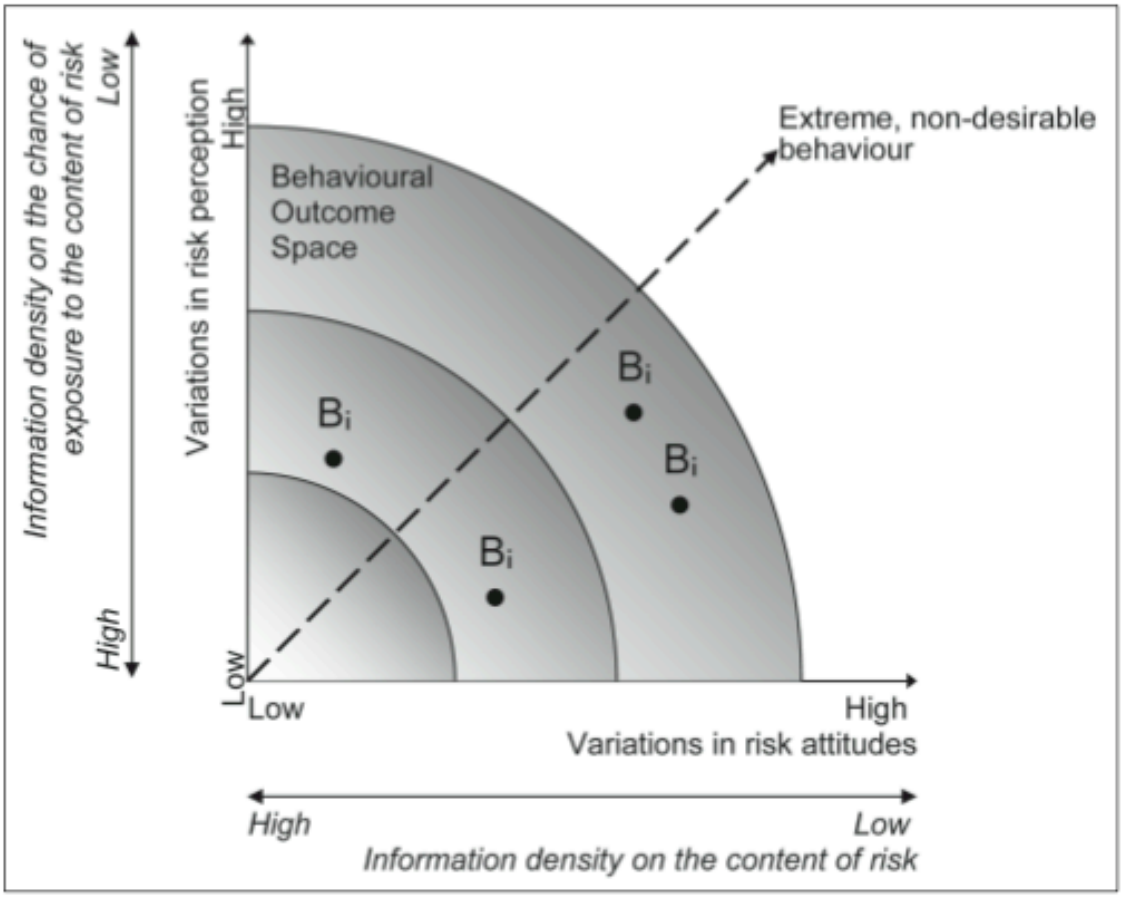
In considering the age of warning message recipients two groups stand out as needing particular attention. “We lack information on how children may or may not access, interpret, and respond to forecasts and warnings.” (Phillips & Morrow, 2005) The elderly are also a special population. Neither population is of critical interest to this study.

Psychological characteristics can range from personality to cognitive disabilities that affect response to a warning.

Pre-warning characteristics includes risk attitude and risk perception. Risk attitude is "a decision maker's general predisposition to a risk in a consistent way" (Pennings & Grossman, 2008), that is, a person's feelings towards a particular type of emergency. Risk perception, "reflects the decision maker's own interpretation of being exposed to the content of the risk," that is, the chance that the risk will be realized for that person. (Pennings & Grossman, 2008)

There are a number of considerations involved with prior knowledge of emergencies. One way to view the possible reaction of a given member of the at-risk-population is to imagine a graph of the possible outcomes to any given warning. The outcomes range from the desired response to the warning to extreme behavior, such as panic. In a fast moving event an alert will have a definite likelihood of occurrence reducing the variation in the y axis in Figure 2.2.2.1, risk perception.

Figure 2.2.2.1 Possible behavior (Pennings & Grossman, 2008)



Giving adequate pre-warning education about risk will, in theory, reduce the variance in the x axis, risk attitude. In a fast moving warning there will not be time to supply the education on the risk; it must be provided and learned ahead of the warning. The basic theory behind the behavior outcome space (BOS), depicted in Figure 2.2.2.1 is that given good information about a risk and about the likelihood of it happening, the amount of variation in actions in response to the warning will be reduced.

Another pre-warning factor is the experience by the warned population of false alarms in the past. One study found a significant portion of the falsely warned population suffered false alarm effect, "[t]here was a significant decrease in (1) the perceived

importance of the earthquake threat, (2) protective behavior, (3) time spent thinking about the prediction." (Atwood & Major, 1998)

Taken together the message factors and receiver attributes influence the warned population's response to a warning, e.g., will they evacuate or not. Understanding what influences are being exerted on the University student population enables more effective warnings and are thus important to study.

In both areas, receiving messages and understanding, believing, personalizing, there is a noticeable lack of research focused on the college student population. In light of the recent outbreaks of violence at major universities the study presented here is timely and potentially useful.

3.0 Methodology

An anonymous survey was administered using the online survey website SurveyMonkey (http://www.surveymonkey.com). Participation was open to any currently enrolled students at the University of North Carolina at Chapel Hill; this population includes undergraduates, graduate, professional, and continuing education students.

An invitational email was sent out through the University's mass email system. No other recruitment methods were used. The survey was limited to students 18 years of age and older. The results may be biased because of the single source of enrollment; students less likely to actively check email or who had opted out of the bulk email system would have less chance of hearing about and responding to the survey.

3.1 Survey

The survey asked questions in three broad categories: demographics, ownership and use of communication technologies, and knowledge of general and campus specific emergency procedures. Three questions had to be removed from the final data set due to survey errors. The original survey is shown in Appendix B.

Demographic questions asked about basic attributes of the students: age, gender, academic status, where they lived and general ability to receive and respond to alerts.

The communications questions addressed the ownership and use of communication technology such as cell phones, television, radio, web browsers and text messaging

during the day-to-day life of the students. Students were asked specifically if their cell phone was subscribed to the UNC Mobile phone plan because everyone in that plan is automatically subscribed to the campus alert system.

Security questions focused on the background knowledge and school specific knowledge of emergencies the students possessed. Questions focused on student response to an official email, their awareness of campus security issues, and their potential and actual response to emergencies.

3.2 Setting

This study was conceived of after the Virginia Tech tragedy in April of 2007. The survey was prepared and in draft when the shootings at Northern Illinois on February 15th of 2008 prompted UNC Chapel Hill to issue an email outlining security procedures at the University, shown in Appendix A. The survey was changed to reflect the new base of knowledge the student body was operating from. Finally, immediately before the survey was scheduled to run, a prominent member of the student body at UNC Chapel Hill, Eve Carson, was murdered. Although the University sent a rash of additional emails to students, the survey was run without further changes. The ever-changing body of knowledge the student body had and the dynamic external environment surrounding the University certainly affected students' responses, (as demonstrated by comments respondents made at the end of the survey, for example), but further delay in hopes of a calm period was infeasible.

4.0 Results

4.1 Demographics

A total of 363 participants started the survey and 331 completed it. Respondents' ages ranged from 18 to 57, with a mean of 24.6 and a median of 22. Women were over-represented; 272 (82.2%) completed the survey but they comprise only 58.6% of the total school enrollment [UNC, 2008] based on the Fall 2007 enrollment figures.

An apparent bias in respondents' academic status can be partially explained by the grab bag nature of the graduate student heading, which combines graduate, doctoral, professional, and continuing education students. Based on the UNC Fall 2007 enrollment information [UNC, 2008] seniors and juniors are over-represented and freshman, sophomores and the Graduate pool are under-represented in the survey responses (Table 4.1.1).

Table 4.1.1: Survey Respondents by Academic Status

	Number of Students (%)	**UNC Fall 2007**
Academic Status		
Freshmen	23 (6.90%)	3933 (14%)
Sophomore	31 (9.40%)	4095 (15%)
Junior	70 (21.10%)	4414 (16%)
Senior	89 (26.90%)	4696 (16%)
Graduate Students	118 (35.60%)	10508 (38%)

Two hundred thirty-nine (72.2%) students reported living off campus. A follow-up question regarding distance from campus was erroneously entered on the survey and the data was unusable.

Two hundred twenty (66.5%) students have none or only one roommate, and an additional 87 (26.3%) report having 2-3 roommates.

Three hundred sixteen (95.5%) students reported English as their first language. For students who did not have English as a first language 2 (9.5%) reported being "relatively comfortable" and 19 (90.5%) reported being "comfortable" speaking and understanding English. Twenty-one people reported their comfort level with English, but only 15 indicated that English was not their first language.

Only two participants indicated having any disability preventing them from receiving an alert, and one of them was an error. (The respondent felt his or her lack of a text-messaging device was a barrier to receiving an alert.). Three participants reported having a disability that would prevent them from responding to an alert; of those, two were chronic conditions and one a temporary injury.

4.2 Cell Phone and Communications

Only one student did not own a cell phone, and 3 students reported using the UNC Mobile phone plan. Student phone capabilities are listed in Table 4.2.1.

Table 4.2.1: Cell phone capabilities

	Number of Students (%)
Cell phone feature	
Text messaging	315 (95.5%)
Web access	102 (31%)
Email	57 (17.3%)

Two hundred forty four (75.5%) of the cell phone owners are subscribed to the UNC campus messaging alert system, and almost half (117, 47.2%) (Table 5-2) signed up after the university sent out an email on Feb 16th 2008 in response to the Northern Illinois shootings.

Table 4.2.2: Sign-up date for UNC campus alert program

	Number of Students (%)
Sign up date	
Before the Fall 2007 semester	15 (6%)
During the Fall 2007 semester	70 (28.2%)
During the Spring 2008 semester before February	46 (18.5%)
During the Spring 2008 semester after February	117 (47.2%)

One hundred eleven (33.5%) students reported owning a landline phone in their home.

Students were asked to report in open format about the frequency and length of activities they engaged in during the day that isolated them from cell phones or other communication devices and whether or not they were alone during the activities. Up to

three activities could be reported. Two hundred twenty-one students reported at least one activity, 118 reported two activities, and 37 reported 3 activities. (Table 4.2.3)

Activities were included in Table 4.2.3 if they were reported by 5 or more students. Activity types with fewer than five responses were grouped together in the "outlier" category.

Table 4.2.3: Activities that isolate from communication technologies

	Number of Responses
Activities	
Outdoor exercise	81
Indoor exercise	77
Attending class	73
Working	47
Outlier	20
Sleeping	13
Exercise (location unspecified)	10
Showering	10
Attending meetings	9
Being at the Library	7
Studying	7
Being at home	6
Working in a Lab	6

Eleven students reported never being without their cell phones, and three reported their phones were rarely on. Twenty-nine students reported being involuntarily disconnected through signal loss during an activity. For example, one student reported, “reception on campus sucks so when i am in some buildings, i don't have reception nor do i get reception at work. I work 5 hrs on monday, wednesday and friday.”

This contrasts with voluntarily disconnection such as the student who reported, “I turn my phone off for class, which means it is off for approximately three hours per day.”

In 33 of the reported activities students reported being alone.

Survey respondents reported being online with a web-enabled device such as a laptop, home computer or iPhone for 5.8 hours per day on average, with a median of 5 hours. The difference between this average and the reported average in the ECAR (Caruso & Salaway, 2007) study, 2.35 hours, may have to do with the phrasing of the question. Respondents were asked about the total time online, but not time actually performing online activities. For example, time spent writing a paper on a connected laptop would count in this study but not in the ECAR study.

Two hundred and three (61.3%) students reported being online during the day with a web browser when their phone was either inaccessible or not connected.

Three hundred and six (92.4%) respondents have a television and 260 (82.8%) have cable TV. Thirty (9.8%) have Satellite TV. Eighty-six (26.60%) respondents don't watch TV at all and 139 (43%) watch 1-2 hours per day, Table 4.2.4 shows average hours with a TV on for all students.

Table 4.2.4: Average time spent with a TV on

	Number of Students (%)
Hours	
0	86 (26.60%)
1-2	139 (43.00%)
3-4	69 (21.40%)
4-6	21 (6.50%)
6+	8 (2.50%)

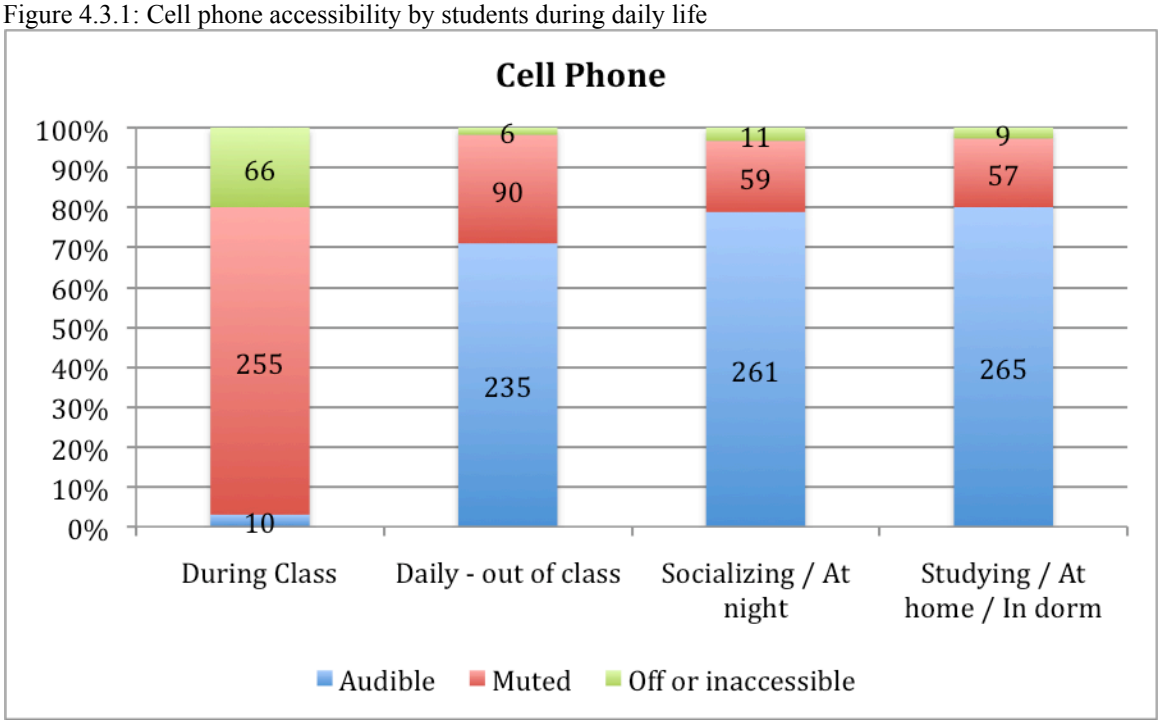
Two hundred eighty one (87.9%) students have access to a local radio, but 180 (57.9%) report not listening to it at all on average. One hundred sixteen (37.3%) listen 1-2 hours a day and 15 (4.8%) listen to radio more than 2 hours. Thirty-seven (11.2%) listen to Internet and satellite radio. Among students listening to Internet and satellite

radio 27 (81.8%) listen to non-local stations with 3 (9%) listening to local programming. Seventeen (5.1%) students own a weather radio.

4.3 Daily Use of Communication

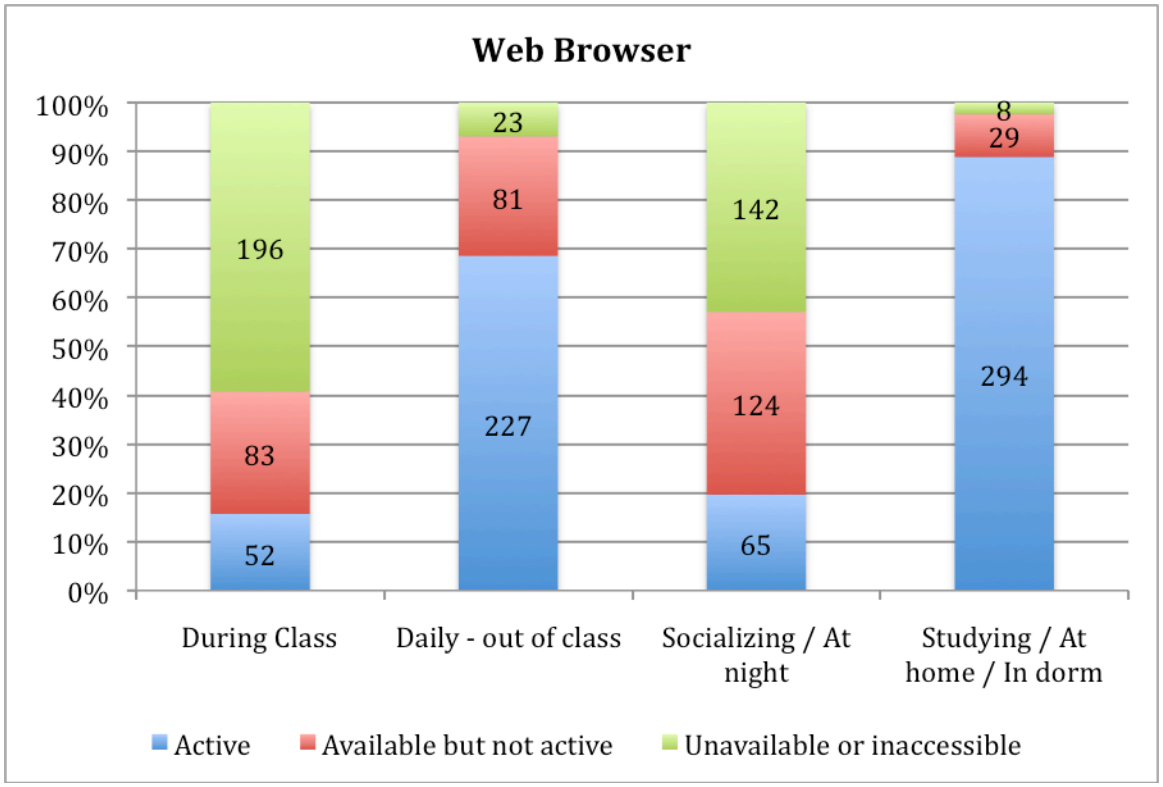
Students were asked to report on the availability and the status of their cell phones, web browsers, email and text messaging in various settings during the day.

Figure 4.3.1: Cell phone accessibility by students during daily life



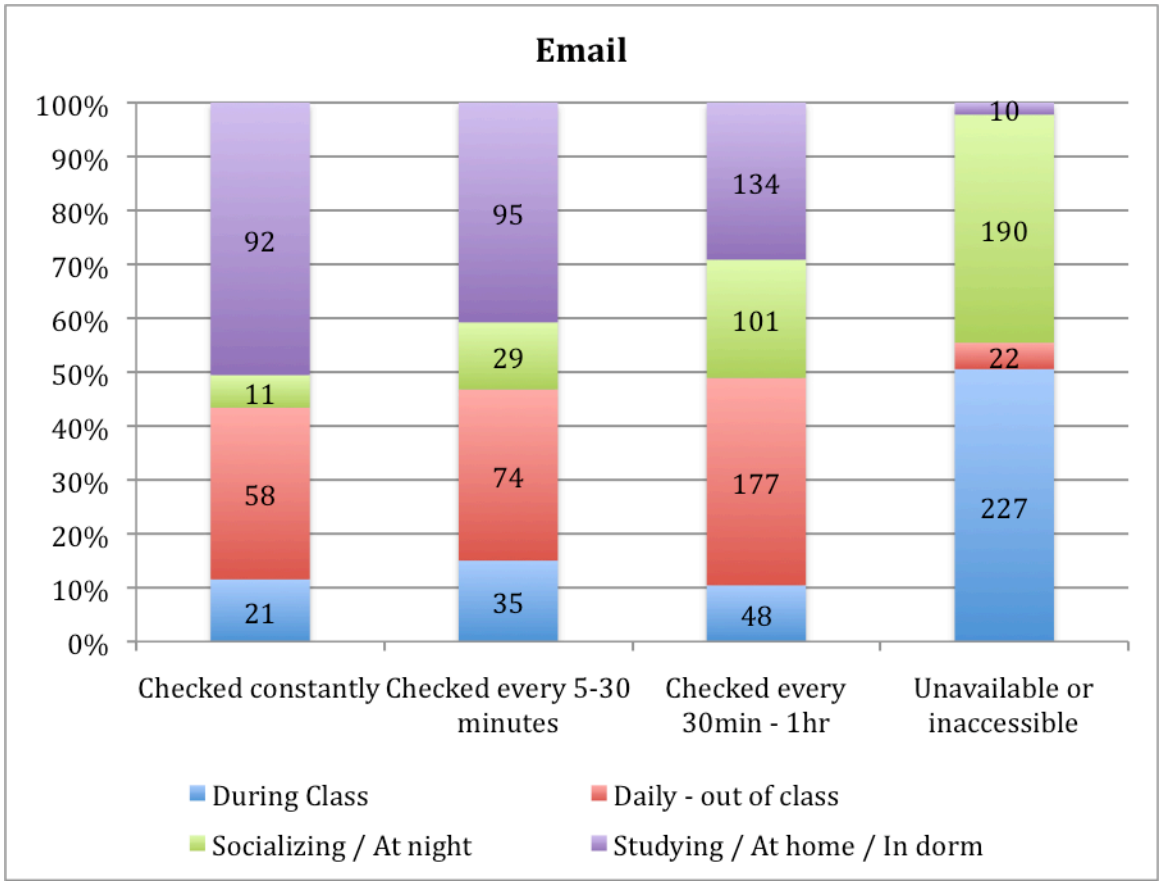
In all four settings cell phones are rarely off and remain accessible with classes being the only activity where a large number of cell phones are turned off. Some students do show a preference for keeping their cell phones muted at all times.

Figure 4.3.2:Web browser accessibility by students during daily life



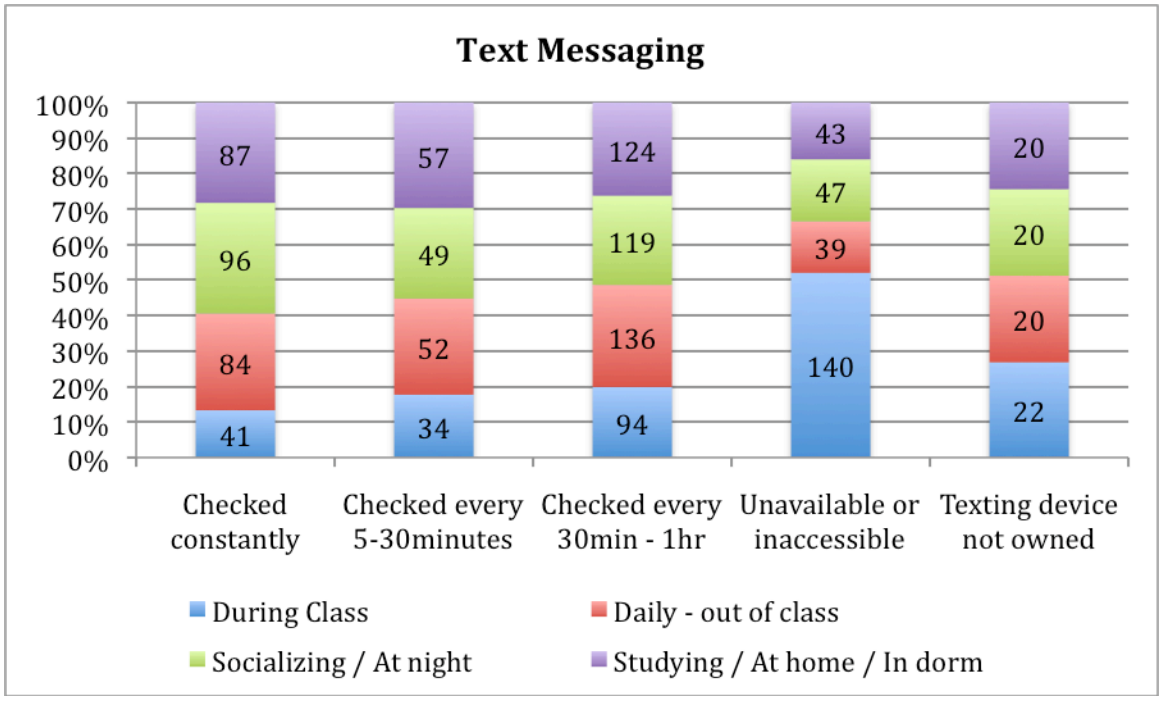
Web browsers are more commonly unavailable to students in class and during socializing activities. This is possibly attributable to being accessed through laptops and desktop computers, which are not always available or permissible to use.

Figure 4.3.4: Email use by students during daily life



Email use is dependant on a device capable of either receiving the email directly, such as a Blackberry, or using a web browser. Most students do not have access during the same two activities where there was high unavailability of web browsers: class and socializing. During other activities email is checked fairly frequently on average.

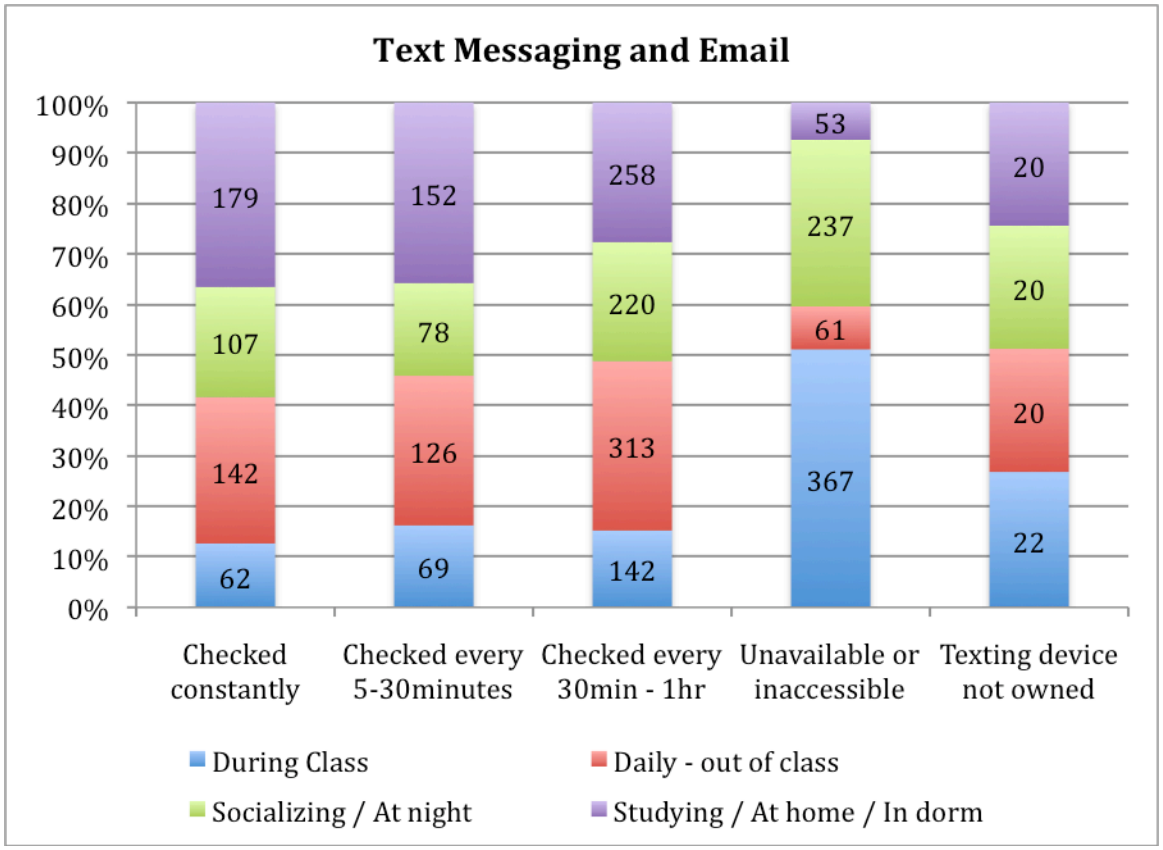
Figure 4.3.5: Text messaging use by students during daily life



Text messaging, like the cell phones it is tied to, is more available at all points in the day. 140 (42.3%) students still report that they do not have access to text messaging during class.

One hundred sixty nine (51.06%) students do access text messaging at least once during class. It is unclear why students would be unable to access text messaging when out of class, socializing or being home.

Figure 4.3.6: Text messaging and email use by students during daily life



With text messaging and email use combined, the trend of unavailability during class is clear, with socializing coming in second. Two hundred seventy three (82.48%) students still report accessing one or the other during a class period.

4.4 Security

The final section of the survey dealt with matters of security. Questions focused on student response to an official email, their awareness of campus security issues, and their potential and actual response to emergencies.

The University sent out an email on February 16th 2008 in response to the shootings at Northern Illinois University. The survey used this email as an indicator of student concern with safety matters. The full text of the email is available in Appendix A.

Three hundred and ten (93.7%) of the students reported reading the email, but only 218 (65.9%) visited the Alert Carolina website referenced in the email and 150 (45.3%) viewed the Alert Carolina poster on that site.

Thirty-seven (11.2%) students had visited any of the other emergency services/response web pages maintained by the university.

Before the February 16th email 240 (72.5%) students were familiar with the email alerts system the university has in place.

Five percent of the 100 students who indicated they lived in a dorm reported having met with dorm residents to discuss what to do in an emergency. During their daily time on campus students reported most often being in classrooms or offices, followed by dorms and libraries. (Table 4.4.1)

Table 4.4.1: Buildings students are most often in

	Number of Responses
Building Type	
Classrooms/Offices	187
Dorm	66
Library	52

Student Union	22
Gym/Athletic facilities	10
Hospital	8
Misc.	4
Cafeteria	3

Sixteen (4.8%) students know who the Emergency Coordinator is for the building they spend the most time in, and 85 (25.7%) know the evacuation plan for that building.

Students were asked in an open format for their definition of a commonly used term in emergency management, “shelter-in-place”. The core definition supplied by the Red Cross is, “Shelter-in-place means selecting a small, interior room, with no or few windows, and taking refuge there” [Red Cross, 2008]. In this definition two main concepts, being inside and finding a secure location there, were selected to judge student responses.

In addition students could list points from the expanded definitions for different types of emergencies and locations, (e.g., home or office). For example “close and lock all windows and exterior doors” would be applicable if you were at home. (Table 4.4.1)

Table 4.4.1: Shelter-in-place concepts (includes complete answers)

	Number of Responses
Concept	
Inside	184
Secure	56
Additional	63
No core concepts	145

The "no core concepts" answers were either ambiguous, incorrect, or stated that they didn't know what the term meant. Ambiguous responses were those that stated students would stay in place or find a safe spot without providing further information. Although

correct if the respondent was referring to being inside he or she would be incorrect if outdoors. Incorrect answers would place the respondent into danger or not alleviate the danger, for example “go where everyone else is going” or “go home”.

Table 4.4.2 shows the number of complete and incomplete answers.

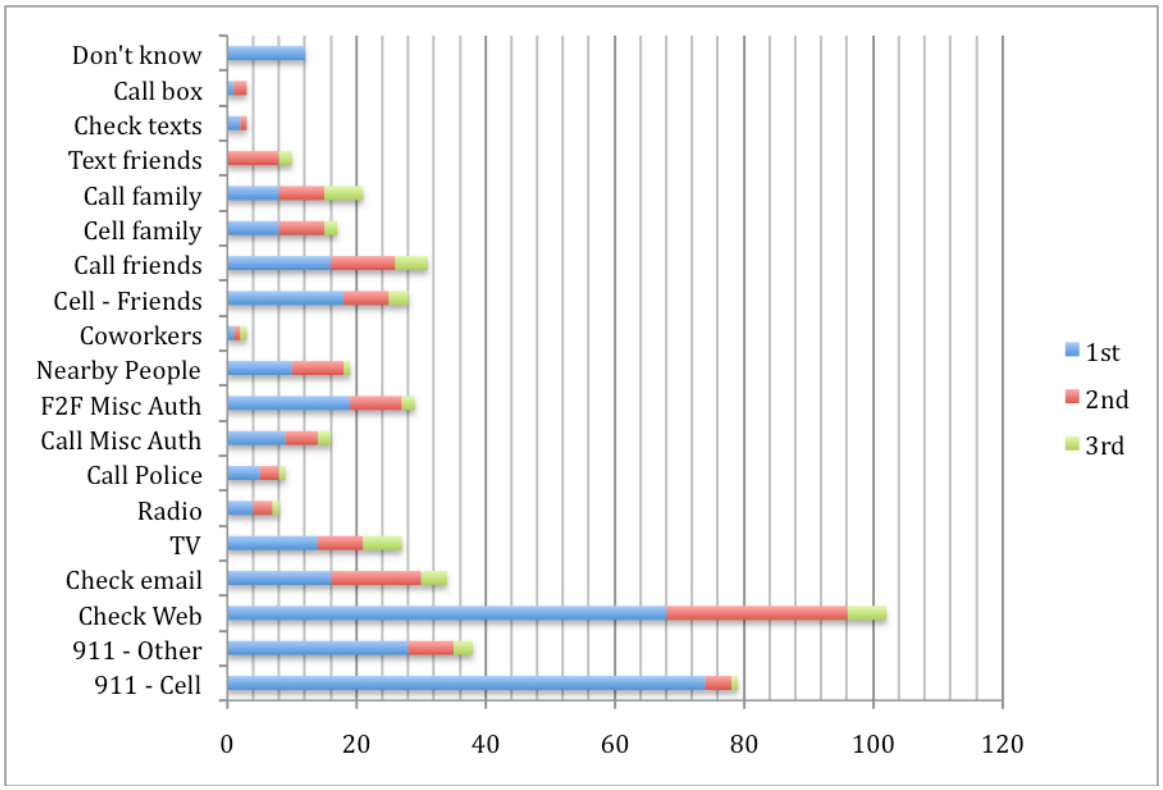
Table 4.4.2: Complete and incomplete Shelter-in-place answers

	Number of Responses
Completeness	
Inside & Secure & Additional step	14
Inside & Secure	40
Did not know	45

Two hundred sixty-two (79.2%) students reported trusting the University to issue the best possible instructions in an emergency.

Students were asked in an open format who they would seek out for confirmation and more information during an emergency and over what communication channels. The intent of the question was not in reference to an emergency unfolding before them, but the large number of references to calling 911 for more information shows a possible misreading of the question. (Figure 4.4.1)

Figure 4.4.1: Who and over what channels would you seek more information in an emergency (in order of selection first, second, third)



911 was the most selected source of additional information, with the web close behind. The web is also the favorite second source of information. Friends are more likely to be contacted than family. The "miscellaneous authority" columns refer to figures such as a boss, a department head, a dean, or other University staff member not directly responsible in an emergency.

Two hundred seventy one (81.9%) students were aware of the new siren system installed during the Fall 2007 semester. Twenty (6.0%), were present for the first set of tests during the start of Christmas break 2007. Among the students present for the test and able to hear the sirens 13 (65%) could not understand the messages given during the tests.

Students were asked what they would do first if the sirens were activated. (Table 4.4.3)

Table 4.4.3: What would you do if the sirens were activated?

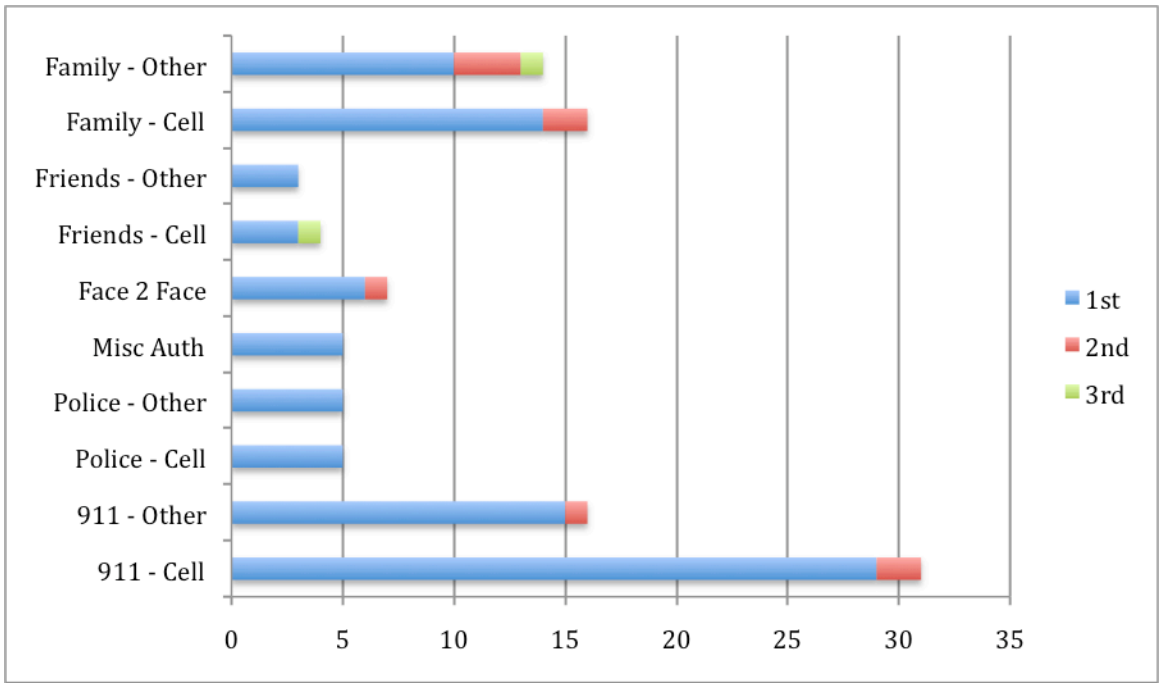
	Number of Students (%)
Action	
Follow siren's instructions	181 (54.70%)
Check with nearby students	74 (22.40%)
Check email	24 (7.30%)
Check University web site	19 (5.70%)
Check with university staff	11 (3.30%)
Call a friend	10 (3.00%)
Call a relative	6 (1.80%)
Check Alert Carolina web site	6 (1.80%)

In a similar vein students were asked if they would seek confirmation from other sources if they received an email alert from the university, to which 242 (73.1%) responded in the affirmative.

To assess students' exposure to emergency situations they were asked if they had been in an emergency situation before, such as a fire, major traffic accident, violent incident etc. Only 128 (40%) had, and of that 128, 80 (60%) had been directly involved and 48 (36%) had been observers.

Students who had been observers or directly involved in an emergency situation were asked about who they had contacted and how. (Figure 4.4.2)

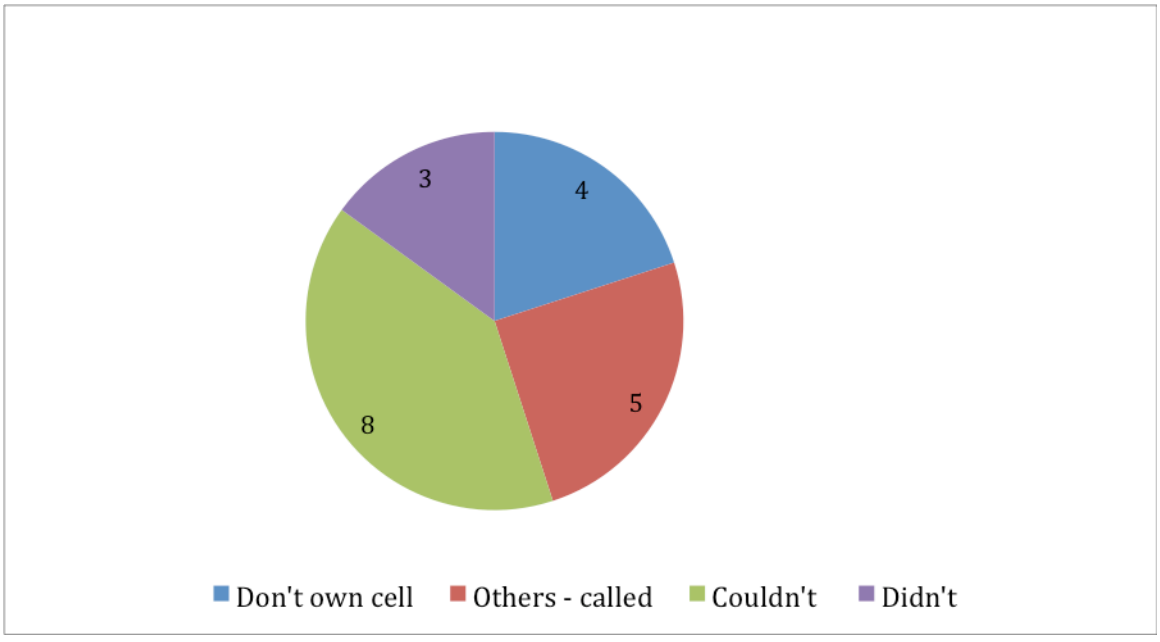
Figure 4.4.2 Contacted during an emergency



911 is again the most popular choice, but family moves ahead of friends in real life situations where the emergency is unfolding.

A small set of respondents didn't contact anyone. (Figure 4.4.3)

Figure 4.4.3: Reasons for not contacting anyone



5.0 Discussion

5.1 Demographics:

The large percentage of female respondents is interesting, with 272 (82.2%) completing the survey but only comprising 58.6% of the UNC Fall 2007 enrollment. It is unknown if the high response rate is typical, is related to the nature of the survey (dealing with security and safety) or the result of it's being run in the immediate aftermath of the murder of a prominent female member of the student population.

The participation of undergraduates follows a definite increase by year that is unexplained. Two possible factors are their degree of identification with the university community and the membership of the murder victim in the senior class.

Although only a small number of students reported being unable to receive (2) or respond to an alert (3) it is interesting that one of the respondents had a temporary injury that prevented response. It is likely that an injured person would have less knowledge of support structures designed to assist the disabled and chronically ill and would be less prepared. The university may not have knowledge of an individual's injury either. Students with disabilities are registered with the university, but a temporary physical injury may go unreported to the administration.

A second point of interest is the general nature of the receive and respond questions, results may have been different if students were asked if they would be able to receive warnings over particular channels or at selected times of day. For example, hearing

impaired students may be confident of receiving an alert they would be able to interpret, such as an email or text messages They may not have considered that they may be unable to hear a siren while sleeping and out of contact with their email and text messaging devices.

The large pool of graduate level and junior and senior students contributes to the almost three quarters of students who reported living off campus. Although the University must focus security efforts within the campus, it should be noted that in the event of an emergency out-reach to off-campus students is important. Off-campus students will need to be appraised of the on campus situation to make decisions about travel onto campus.

5.2 Cell Phones and Communication

Ownership of a cell phone with text messaging capability is almost universal among the students, a trend that is likely to continue to approach 100%. Students are still muting them for class but they aren't turning them off and ignoring their text messages or shutting down their web browsers and not checking email. In every class and every social activity it becomes likely that a student in close proximity is connected to at least one communication channel.

There is still a gap between cell phone with text messaging ownership and enrollment in the official University text messaging program. The University does not offer a voice alert solution at this time, so students who are not signed up to receive official text messages have to rely on either hearing a siren, being told by a warned student, or accessing another channel such as email or television. Signups for the messaging

program have traditionally been lackluster. It is possible that the same population willing to complete a survey about alerts would be the same population most likely to have signed up for them. No exact figures on total University participation were available.

Students are also in situations where they can access a web browser but not their phones. The email alerts program takes advantage of this channel currently, but additional channels may be available and should be explored.

When asked about being isolated students, tended to focus only on their cell phone being available or not. They disregarded the context in which the activities they performed without their cell phones or cell phone signals occurred. For example, "working out at the gym, without a cell phone" is a typical answer in the indoor exercise category. It isn't clear exactly what the gym environment is, but it is likely there is a University employee in the area, a working landline phone, televisions, and/or other students nearby and entering and exiting the facility with cell phone access. It is unlikely that everyone in a class, gym, or workspace will also be isolated at the same time. In class, for example, 273 (82.48%) students report accessing text messages or email at least once, with a small group reporting constant use of both technologies.

Two categories of isolated individuals stand out. There is a small group of students that report self-isolation, deliberately disconnecting from the world, "occasionally, I intentionally isolate myself from my phone, internet, etc. in order to be more productive." This small group will have to rely on getting a warning either directly from a siren or second hand from another student or nearby individual.

A larger second group find themselves disconnected during their day involuntarily, lacking cell phone signal in their activity areas, “office work - no reception - i take breaks about every 2 hours to check my messages.” Again it isn’t clear that the students are truly isolated in these situations, although they may be denied cell phone access. The lack of cell phone service across campus should be addressed, however, if it is a linchpin warning service.

Outdoor exercise was the largest contributor both to the genuinely isolated and alone conditions, “running 3-4 times a week for about 30-45 minutes and I am usually alone”

An interesting trend is the combination of low numbers of students owning a landline phone and the number of people reporting that their cell phones are either off or out of earshot during sleep. Without a landline phone or active cell phone they are truly isolated from most warnings except sirens.

The radio is in sharp decline from historical levels, although the functionality to receive radio broadcasts remains built into many devices. Internet and satellite radio are not picking up much popularity and both sources are not likely to be local in nature and thus not a useful source of information. Television and cable television remain important channels, although not necessarily ideal for a fast moving event.

5.3 Security

A need for basic education among students on a number of topics is evident. The concept of “shelter-in-place” for example is a principle component of many emergency plans ranging from bad weather to chemical spills and violent incidents. One hundred and

forty five of the responses to the question contained no reference to core concepts of “Inside” and “Secure room”. Fifty four responses did contain both core concepts, but 45 students reported having no idea what the term meant. It is questionable whether if asked to “shelter-in-place” a majority of the student body would respond appropriately.

Although some bias is suspected in the responses to the question about what information sources student would turn to in an emergency, the number of "911" replies still stands out. 911 is not designed to provide information in an emergency and switchboards would be overwhelmed if it was used in this way. The web, email, and television responses point to an understanding of those sources for information, but the number of friends and family points to a lack of viable telephone based information source for students. That is, students view their cell phones as an excellent data channel but don’t have a good source to get voice based information in a crisis.

Interestingly, a number of people who reported their friends and family as primary places to turn for data also indicated they would ask them to access the web, TV or radio for them. This again points to a lack of authoritative non-911 source of information students feel they can reach from their cell phones. A service such as the 311 number New York City has set up to answer questions could be developed and advertised to replace reliance on 911.

When asked whom they contacted first in an emergency 911 was the overwhelming first choice. Family was the second most popular to contact with friends trailing behind as fourth most popular. This contrasts with the students’ preference for friends over family when asked where they would turn in a hypothetical emergency for more

information. The students' age may be a factor in this, for most students any emergency would have happened in their teens, and family is an excellent place to turn for information when unsure on the correct actions.

There is no expected baseline for the percentage of students who "trust" the University to issue the best possible instructions. However, extending the 20.08% of the students in the survey who indicated that they did not trust the University to issue the best possible instructions to the entire student body yields 5824 students, a worrisome number.

On the other hand, given that the activities listed by Perry and Ning (1985) to build trust between a population and an authority overlap in large part with activities that would serve to increase education of the student body it might be that solving one problem will partially at least mitigate the other. Added visibility of the authorities responsible in emergencies and increased education activities from visible members of those bodies should serve to increase the credibility of University issued alerts.

Students overall have made little effort to explore University safety procedures on their own, so University-driven education will have to suffice for the majority. Even after the second major shooting on a campus in a year only 65.8% of the students reported being willing to click on a link to review the new Alert Carolina site. Only 5% of dorm residents have ever met to discuss emergency procedures. Evidence of this reluctance to drive their own emergency education is persistent and unlikely to change if it has not changed already.

6.0 Conclusion

Two threads run through the data. First, students are extremely connected at most points in their lives, but still become personally isolated from outside sources during some activities. Typically, they are not then isolated from fellow students and are reachable through many channels second hand,, that is, through word of mouth. Therefore, more research is needed on the transmission of warning messages through student populations.

Second, students' knowledge of disaster and emergency response is lacking. Students apparently don’t have much curiosity or natural initiative in exploring the safety procedures in place at the University. The University provides resources and some education through web sites and email, but the large gaps in knowledge shown in the survey speaks to a need for expanded efforts.

Students show a marked preference for reaching out with voice communications during an emergency. However, they, do not have anywhere to turn except 911 if they desire to reach an authoritative source of information over a voice connection. Although correct in the case of being part of an unfolding emergency, 911 is not an ideal channel for dispensing information during an emergency. It is likely that a large scale emergency will jam the local cellular network, but it may also be true that if students need to try to reach out to fewer sources the load would be reduced.

As phones become more and more capable of providing web and email access the reliance on these devices will increase. If underlying issues of signal and network capabilities are not addressed a false sense of being in touch could become a problem.

Just under a majority of the students signed up for UNC text messaging alerts did so after the February 16th reminder. Although ¾ of the students surveyed are signed up now, unless a similar effort is made to reach new members of the University community each year, the low numbers are likely to persist.

From the standpoint of the University the multiple possible channels available is good news. Cell phone and web technology have pierced into most private spaces, students are almost universally available somehow during most reported activities, with the sole major exception of outdoor exercise.

This University has prepared extensively for emergencies with a well thought out communication system of email, text messages, and sirens in place and securely set up. There are gaps in the coverage: parts of campus inside and out have poor cell phone coverage and/or too much distance from sirens and this should be addressed. The principal challenge is to prepare students ahead of time with comprehensive education on emergencies.

Bibliography

Aguirre, B. E. (1991). *Saragosa, Texas, tornado, May 22, 1987 an evaluation of the warning system*. Natural disaster studies, v. 3. Washington, D.C.: National Academy Press.

Arizona Public Safety Communications Commission (2007). Cell phones continue to fail first responders in major emergencies. *Transmit, 2(3)*. 7-8.

Attwood, L. E., & Major, A.M. (1998) Exploring the "cry wolf" hypothesis. *International Journal of Mass Emergencies and Disasters, 16*, 279-302.

Bracken, C. C., Jeffres, L. W., Neuendorf, K. A., Kopfman, J., & Moulla, F. (2005). How Cosmopolites React to Messages: America Under Attack. *Communication Research Reports*, *22:1*, 47-58.

Bird, J. & Zygmunt, L. (2005). Managing tsunami risk. *The Lancet , 365(9456)*, 271-273.

Burkhart, F.N. (1991). *Media, Emergency Warnings and Citizen Response*. Westview Press

Caruso, J. B. & Salaway, G. (2007). *The ECAR Study of Undergraduate Students and Information Technology, 2007*. EDUCause Center for Applied Research.

Crawford, G. L. (2004). NOAA Weather Radio (NWR) – A Coastal Solution to Tsunami Alert and Notification. *Natural Hazards, 35*, 163-171.

Cutter, S., L., Tiefenbacher, W.D. & Solecki, (1992). En-gendered fears: Femininity and technological risk perception. *Industrial Crises Quarterly, 6*, 5-22.

King, D. (2008). How people responded to the April 2007 tsunami warning in Cairns and Townsville. *Australian Journal of Emergency Management, 23(1)*, 10-20.

Division of Student Affairs (2007). *NYU Undergraduate Time-Use Study.* NYU Office of Research and Assessment

Ellison, N., Steinfeld, C., Lampe, C., (2006). *Spatially bounded online social networks and social capital: the role of Facebook*. Proceedings of the Annual Conference of the International Communication Association. Retrieved March 12th 2008 from http://www.msu.edu/~nellison/pubs.html

Frédérique M., Ad D.R. (eds.) (2007). *Good practice delivering flood-related information to the general public*. European Commission, Joint Research Centre, Institute for Environment and Sustainability

Free, N. J., *Evaluation of the Ferny Creek Fire Alert Trial*. Retrieved March 5th, 2008 from http://www.ema.gov.au/agd/EMA/rwpattach.nsf/viewasattachmentpersonal/(63F21BC6A4528BAE4CED2F9930C45677)~DC+free++tion+of+the+Ferny+Creek+Fire+Alert+Trial+2003.pdf/$file/DC+free++tion+of+the+Ferny+Creek+Fire+Alert+Trial+2003.pdf

Fritz, C. E. (1961). Disaster. In R.K Merton & R.A. Nisbet (Eds.), *Contemporary social problems* (pp. 651-594). New York: Harcourt, Brace & World.

Golder, S., Wilkinson, D., & Huberman, B. (2006). *Rhythms of social interaction: messaging within a massive online network*. Retrieved April 10, 2008 from http://arxiv.org/abs/cs.CY/0611137

Lindell, M.K & Perry R.W. (1992). *Behavioral Foundations of Community Emergency Planning*. Hemisphere Publishing Corporation.

Meeds, H. (2006). *Communication challenges during incidents of national significance: A lesson from Hurricane Katrina*. U.S. Army War College. Retrieved April 1st

from http://www.strategicstudiesinstitute.army.mil/pubs/display-papers.cfm?q=424

Mileti, D. S. (1995, Nov.). *Factors Related to Flood Warning Response*. U.S. – Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods, Perugia, Italy.

Mileti, D. S., (1999). *Disasters by Design, A Reassessment of Natural Hazards in the United States*. Washington D.C.: Joseph Henry Press.

Office of Institutional Research and Assessment, Students by Level, Race, and Gender, Fall 2007. University of North Carolina at Chapel Hill. Retrieved March 21, 2008 from http://oira.unc.edu/facts-and-figures/student-data/enrollment-and-student-characteristics.html

Patric, S. R., Lachlan, K. A. & Griffin, D. R. (2007a). Crisis Communication, Race, and Natural Disasters. *Journal of Black Studies, 37*, 539-554.

Patric, S. R., Lachlan, K., Burke, J. M., & Seeger, M. W. (2007b). Media use and information needs of the disabled during a natural disaster. *Journal for the Health Care of the Poor and Underserved, 18*, 394-404.

Peguero, A.A. (2006). Latino Disaster Vulnerability: The dissemination of hurricane mitigation information among Florida's homeowners. *Hispanic Journal of Behavioral Science*, 28 (1), 5-22.

Pennings, J. & Grossman, D. (2008). *Responding to crises and disasters: the role of risk attitudes and risk perceptions*. Retrieved March 16th, 2008 from http://www.blackwell-synergy.com/doi/abs/10.1111/j.1467-7717.2008.01048.x

Perry, R.W. (1979). Evacuation decision-making in natural disasters. *Mass Emergencies*, 4(1), 25-38

Peters, R. G., Covello, V. T., & MacCallum, D. B. (1997). The Determinants of Trust and Credibility in Environmental Risk Communication: An Empirical Study. *Risk Analysis, 17(1)*, 43-54.

Phillips, B.D. & Morrow B.H.(2005). *Social science research needs: A focus on vulnerable populations, forecasting and warnings*. Hurricane Forecast Socio-economic Workshop, Pomona California.

Red Cross. *Shelter-in-place in an emergency*. Retrieved April 13th 2008 from http://www.redcross.org/services/disaster/beprepared/shelterinplace.html

Riad, J.K., Norris, F.H., Ruback,R.B. (1999). Predicting evacuation in two major disasters: Risk perception, social influence, and access to resources. *Journal of Applied Social Psychology 29(5)*, 918-934.

Tierney K.J., Lindell, M.K., Perry (2001). *Facing the unexpected. Disaster preparedness and response in the United States*. Joseph Henry Press, Washington D.C.

University of North Carolina, Enrollment and Student Characteristics. Office of Institutional Research and Assessment. Retrieved April 16, 2008 from http://oira.unc.edu/facts-and-figures/student-data/enrollment-and-student-characteristics.html

Virginia Tech, (2007). *Internal Review: Information and Communications Infrastructure*. Press conference, August 22, 2007.

Wood, V.T. & Wesiman, R.A (2003). A hole in the weather warning system. *Bulletin of the American Meteorological Society,* 84(2), 187-194.

Working Group on Natural Disaster Information Systems Subcommittee on Natural Disaster Reduction (2000). *Effective Disaster Warnings*. National Science and Technology Council Committee on Environment and Natural Resources.

Appendix A: University email after Northern Illinois shooing, sent February 16th 2008

from no_reply@unc.edu
reply-to no_reply@unc.edu,
to tdbwin@email.unc.edu,
date Sat, Feb 16, 2008 at 9:20 PM
subject FORMAL NOTICE: Sign up for emergency safety alerts
mailed-by notify.isis.unc.edu

hide details Feb 16

Reply

Dear Carolina Faculty, Staff and Students:

In light of the tragedy at Northern Illinois University, I am writing about our ongoing efforts to enhance emergency planning and communication at Carolina.

In an emergency, we will send text message warnings to people with cell phones that can receive them and for whom we have cell phone numbers in the campus directory. Last fall, we appealed to students, faculty and staff to register their cell phone numbers. Unfortunately, the response has not been good. If you have not provided your cell phone number in the campus directory, please do so now by updating your personal entry. Visit https://dir.unc.edu/dir/update/home.jsp, enter your Onyen and password and list your cell phone number in the mobile phone slot.

Please also visit alertcarolina.unc.edu, a new Web site that is the primary source for safety-related announcements and resources. There, you will find a link to an Alert Carolina emergency information poster that will be mailed soon to each of you, along with a reusable sticker with related information. These materials will remind you what to do in an emergency or if you have concerns about a student or coworker.

The Web site, poster and sticker support the new siren system, which enhances our ability to warn of any immediate, life-threatening danger. The sirens include public address capabilities to provide specific instructions in case of a life-threatening emergency.

We want people across campus to be careful, watch out for each other and report any suspicious activity. We all have to work together to keep Carolina safe.

Right now, our thoughts and prayers go out to those who were affected by the events at Northern Illinois University. Anyone who feels they might benefit from counseling at this time may receive assistance from the Dean of Student's Office and the University's Counseling and Wellness Services. Call 966-4042 for information.

Sincerely,

James Moeser

This email is sponsored by: Chancellor's Office

Appendix B: Survey Questions

Demographics:
1) Age:
2) Sex: M/F

3) What is your Academic Status?
Freshman, Sophomore, Junior, Senior, Graduate Student

4) Where do you live?
On-Campus / Off-campus

4b) If you live off-campus, what is the distance from campus to your residence?
0-1 miles, 1-4 miles, 4-6 miles, 6+ miles

4c) If you live off-campus what is your principal method of reaching campus:
Walk Ride a bike Car/Motorcycle Bus Other

If you selected other please indicate what method you use:

5) How many roommates do you have?
0-1, 2-3, 4-5, 5+

6) Is English your first language? Y / N

6b) If English is not your first language what is?

6c) If English is not your first language, how comfortable are you with speaking and understanding English?

Not comfortable at all Somewhat comfortable Relatively comfortable Comfortable

7) Do you have any disabilities that would prevent you from receiving an alert? If yes please give a brief description.

8) Do you have any disabilities that would prevent you from responding to an alert? If yes please give a brief description.

Cell-Phone:
9) Do you own a cell phone? Y / N

9b) Does your cell phone have text messaging? Y / N

9c) Does your cell phone have Email Y / N
9d) Does your cell phone have Web access? Y / N

10) Do you own a UNC Mobile phone? Y / N

11) If you do not own a UNC Mobile phone is your cell phone subscribed to the UNC campus emergency alerts? Y / N

11b) If you are subscribed, when did you sign up? (the UNC administration sent a mail on February 16th asking students to sign up)

Before the Fall 2007 semester
During the Fall 2007 semester
During the Spring 2008 semester before February 16th 2008
During the Spring 2008 semester after February 16th 2008

12) Please **describe any activities** you engage in during the day, including their **frequency and length** that isolates you from access to a cell phone or any other communication device and **whether you are alone** during the activity.
For example: jogging or walking in the park without a cell phone.

Activity 1:

Activity 2:

Activity 3:

On-line:
13) Please estimate in hours how often are you online during the day with any web-enabled device such as a laptop, iPhone or desktop computer?

14) Are you ever online with a web browser when your phone is not accessible or connected?

Other Media:
15) At home do you have a television? Y / N

15b) If you have a TV, do you have Cable TV? Y / N

15c) If you have a TV do you have Satellite TV? Y / N

16) Please estimate on average how many hours a day you have a TV on.
0 1-2 2-4 4-6 6+

17) Do you own a landline phone in your home/dorm room/apartment? Y / N

18) Do you have access to local radio? Y / N

18b) If you have access to local radio how many hours a day do you listen to local radio?
0 1-2 2-4 4-6 6+

19) Do you listen to an Internet or Satellite Radio Station? Y / N

19b) If yes, please list the stations you listen to most and estimate hours total per day you listen to all Internet and Satellite radio.

20) Do own a weather radio? Y / N

21) Please answer all the following questions about your daily use of communication technologies.

	During Class	Daily – out of class	Socializing / At night	Studying / At home / In dorm
Cell phone	○ Audible ○ Muted ○ Off or inaccessible	○ Audible ○ Muted ○ Off or inaccessible	○ Audible ○ Muted ○ Off or inaccessible	○ Audible ○ Muted ○ Off or inaccessible
Web browser	○ Active ○ Available but not active ○ Unavailable or inaccessible	○ Active ○ Available but not active ○ Unavailable or inaccessible	○ Active ○ Available but not active ○ Unavailable or inaccessible	○ Active ○ Available but not active ○ Unavailable or inaccessible
Email	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible
Text Messaging	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible ○ Texting device not owned	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible ○ Texting device not owned	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible ○ Texting device not owned	○ Checked constantly ○ Checked every 5-30 minutes ○ Checked every 30min – 1hr ○ Unavailable or inaccessible ○ Texting device not owned

Security:

22) Did you read the email from the University regarding emergency safety alerts on February 16th? Y / N

23) Were you aware of the email alerts program before this email? Y / N

24) Did you visit the Alert Carolina site mentioned in the email? Y / N

25) Did you view the Alert Carolina poster? Y / N

26) Have you ever visited any other emergency related UNC website? Y / N

26b) If you have visited other emergency UNC websites please list which ones.

27) If you live in a dorm, have the dorm residents met to discuss what to do in an emergency? Y / N

28) If you received instructions to "shelter in place" what would that mean to you?

29) What building do you spend the most time in on campus?

29a) Do you know whom the Emergency Coordinator is for that building? Y / N

29b) Do you know the evacuation plan for that building? Y / N

30) Do you trust the University to issue the best possible instructions to you in a crisis? Y / N

31) In an emergency whom would you seek out for confirmation and additional information and over what communication channels? *For example calling 911 on a cell phone*.

32) Do you know about the new siren system the University recently installed? Y / N

33) Did you hear the siren tests conducted on December 19th, 2007? Y / N

33b) If you did hear the siren tests, did you understand the messages? Y / N

33c) Describe where you were during the tests.

34) If the sirens went off, what would you do first?

Call a relative Check email Check University web site Follow siren's instructions
Check with university staff Check with nearby students Call a friend
Check Alert Carolina web site

35) If you received a warning from the University over email would you check with other sources for confirmation? Y / N

36) What three things would you be most likely to do? Please number them in order, 1, 2,3:

Call a relative Check email Check University web site Follow siren's instructions
Check with university staff Check with nearby students Call a friend
Check Alert Carolina web site

37) Have you ever been in an emergency situation before, such as a fire, major traffic accident, violent incident etc? Y / N

37b) Were you directly involved or were you an observer?

37c) Who did you contact first and how?

If you have any comments, observations or additional points you would like to make please provide them below: